

AMENDMENTS TO THE CLAIMS

1. (currently amended) A method for controlling microbes, said method comprising contacting the microbe with at least one functional transition metal silicate selected from the group consisting of:

- (a) cupric silicates having a silica to copper ratio in the range of 1:0.34 to 1:5.15;
- (b) zinc silicates having a silica to zinc ratio in the range of 1:2 to 1:12;
- (c) silver silicates having a silica to silver ratio in the range of 1:15 to 1:19.5;
- (d) manganese silicates having a silica to manganese ratio in the range of 1:1 to 1:1.9;

and

- (e) zirconium silicates having a silica to zinc ratio in the range of 1:0.77 to 1:2.9;

wherein said transition metal silicates are prepared by the process comprising the steps of

- (i) adding a transition metal salt solution to a soluble alkali silicate solution to form a mixture;
 - (ii) forming a precipitate of a transition metal silicate, and
 - (iii) washing and drying the precipitate thus formed to obtain the transition metal silicate;
- ~~wherein in step (i), the ratio between the transition metal salt solution to the alkali silicate solution is varied, the temperature at which the solutions are mixed is varied between 20 to 90°C, and the pH of the medium is varied between about 2 to about 11.~~

2. – 54. (cancelled).

55. (previously presented) The method as claimed in claim 1, wherein the microbe is contacted with cupric silicate which is prepared under acidic conditions, has a silica to copper ratio of 1:5.15, and exhibits the following characteristics: characteristic g values of the peaks as obtained by the electron spin resonance spectrometer being (a) 4.3; (b) 2.5; (c) 2.3; (d) 2.0 and (e) 2.0; and X-ray diffraction analysis having 3 significant peaks at 16.2, 32.2 and 39.7 having peak heights of 2128, 1593 and 1470, respectively.

56. (previously presented) The method as claimed in claim 1, wherein the microbe is contacted with cupric silicate which is prepared under neutral conditions, has a silica to copper ratio of 1:1, and exhibits the following characteristics:

characteristic g values of the peaks as obtained by the electron spin resonance spectrometer being (a) 3.1; (b) 2.3; (c) 2.0; (d) 1.2 and (e) 0.9; and X-ray diffraction analysis having 3 significant peaks at 16.1, 32.2 and 39.7 having peak heights of 940, 764 and 694, respectively.

57. (previously presented) The method as claimed in claim 1, wherein the microbe is contacted with cupric silicate which is prepared under acidic conditions, has a silica to copper ratio of 1:0.78 and exhibits the following characteristics:

characteristic g values of the peaks as obtained by the electron spin resonance spectrometer being (a) 2.2 and (b) 2.0; and X-ray diffraction analysis having 3 significant peaks at 16, 32 and 39 having peak heights of 835, 706 and 502, respectively.

58. (previously presented) The method as claimed in claim 1, wherein the microbe is contacted with cupric silicate which is prepared under extreme acidic conditions, has a silica to copper ratio of 1:0.53 and exhibits the following characteristics: characteristic g values of the peaks as obtained by the electron spin resonance spectrometer being (a) 2.1, (b) 2.0 and (c) 2.1; and X-ray diffraction analysis having 3 significant peaks at 16.1, 32.2 and 39.71 having peak heights of 400, 394 and 330, respectively.

59. (previously presented) The method as claimed in claim 1, wherein the microbe is contacted with cupric silicate which is prepared under extreme acidic conditions, has a silica to copper ratio of 1:0.34 and exhibits the following characteristics: characteristic g values of the peaks as obtained by the electron spin resonance spectrometer being (a) 2.1, and (b) 2.0; and X-ray diffraction analysis having 3 significant peaks at 16.2, 32.3 and 39.8 having peak heights of 541, 414 and 365, respectively.

60. (withdrawn) The method as claimed in claim 1, wherein the microbe is contacted with zinc silicate which is prepared under neutral conditions, has a silica to zinc ratio of 1:12.13 and exhibits the following characteristics: characteristic g values of the peaks as obtained by the electron spin resonance spectrometer being (a) 5.4; (b) 4.5; (c) 2.5; (d) 2.1 and (e) 2.0; and X-ray diffraction analysis having 3 significant peaks at 32.7, 59.5 and 26.2 having peak heights of 444, 307 and 263, respectively.

61. (withdrawn) The method as claimed in claim 1, wherein the microbe is contacted with zinc silicate which is prepared under extreme acidic conditions, has a silica to zinc ratio of 1:2.46 and exhibits the following characteristics: characteristic g values of the peaks as obtained by the electron spin resonance spectrometer being (a) 4.3; (b) 4.0; (c) 2.5; (d) 1.8 and (e) 2.0; and X-ray diffraction analysis having 3 significant peaks at 11.0, 33.5 and 32.8 having peak heights of 2079, 835 and 664, respectively.

62. (withdrawn) The method as claimed in claim 1, wherein the microbe is contacted with silver silicate which is prepared under neutral conditions, has a silica to silver ratio of 1:19.57 and exhibits the following characteristics: characteristic g values of the peaks as obtained by the electron spin resonance spectrometer being (a) 4.3; (b) 2.3; (c) 3.9 and (d) 2.0; and X-ray diffraction analysis having 3 significant peaks at 32.2, 46.2 and 27.8 having peak heights of 3945, 2421 and 1835, respectively.

63. (withdrawn) The method as claimed in claim 1, wherein the microbe is contacted with silver silicate which is prepared under extreme acidic conditions, has a silica to silver ratio of 1:1.04 and exhibits the following characteristics: characteristic g values of the peaks as obtained by the electron spin resonance spectrometer being (a) 4.3; (b) 4.0 and (c) 1.9; and X-ray diffraction analysis having 3 significant peaks at 29.3, 47.6 and 42.3 having peak heights of 2217, 684 and 674, respectively.

64. (withdrawn) The method as claimed in claim 1, wherein the microbe is contacted with manganese silicate which is prepared under neutral condition, has a silica to manganese ratio of 1:1.94 and exhibits the following characteristics: characteristic g values of the peaks as obtained by the electron spin resonance spectrometer being (a) 1.93 and (b) 2.06; and X-ray diffraction analysis having 1 significant peak at 30.6 having peak height of 148.0.

65. (withdrawn) The method as claimed in claim 1, wherein the microbe is contacted with manganese silicate which is prepared under extreme acidic conditions, has a silica to manganese ratio of 1:1.09 and exhibits the following characteristics: characteristic g values of the peaks as obtained by the electron spin resonance spectrometer being (a) 4.3; (b) 4.1; (c) 2.1; (d) 2.1; (e) 2.0 and (f) 1.9; and X-ray diffraction analysis having 1 significant peak at 24.6 having peak height of 32.8.

66. (withdrawn) The method as claimed in claim 1, wherein the microbe is contacted with zirconium silicate which is prepared under neutral conditions, has a silica to zirconium ratio of 1:2.9 and exhibits the following characteristics: characteristic g values of the peaks as obtained by the electron spin resonance spectrometer being (a) 4.42; (b) 1.82; (c) 2.24; (d) 2.3; (e) 2.18 and (f) 1.23;

67. (withdrawn) The method as claimed in claim 1, wherein the microbe is contacted with zirconium silicate which is prepared under extreme acidic condition, has a silica to zirconium ratio of 1:0.77 and exhibits the following characteristics: characteristic g values of the peaks as obtained by the electron spin resonance spectrometer being (a) 4.3; (b) 2.8; (c) 1.9; (d) 1.2; (e) 1.0 and (f) 0.9; and X-ray diffraction analysis having 1 significant peak at 10.8 having peak height of 84.80.

68. (previously presented) The method as claimed in claim 1, wherein the microbes are selected from the group comprising of protozoa, bacteria, fungi, viruses, and combinations thereof.

69. (previously presented) The method as claimed in claim 68, wherein the bacteria is selected from the group consisting of coliform bacteria, Gram positive bacteria, Gram negative bacteria, or a combination thereof.

70. (previously presented) The method as claimed in claim 68, wherein the protozoa is *Cryptosporidium parvum*.

71. (previously presented) The method as claimed in claim 68, wherein the fungus is a pathogenic fungus selected from the group consisting of *Sclerotium rolfstii*, *Rhizoctonia solani*, *Fusarium oxysporium*, *Pyricularia oryzae*, *Aspergillus sps*, or a combination thereof.

72. (cancelled).

73. (currently amended) A method for reducing a level of contaminants, wherein the contaminants are selected from the group comprising of metals, chemicals, pesticides, bio-molecules, and combinations thereof, said method comprising contacting the contaminant with a functional transition metal silicate or a substrate comprising a functional transition metal silicate immobilized thereupon, wherein said transition metal silicate is selected from the group consisting of:

cupric silicates having a silica to copper ratio in the range of 1:0.34 to 1:5.15;

zinc silicates having a silica to zinc ratio in the range of 1:2 to 1:12;

silver silicates having a silica to silver ratio in the range of 1:1 to 1:19.5;

manganese silicates having a silica to manganese ratio in the range of 1:1 to 1:1.9; and

zirconium silicates having a silica to zirconium ratio in the range of 1:0.77 to 1:2.9,

wherein the said transition metal silicates are prepared by the process comprising: (i) adding a transition metal salt solution to a soluble alkali silicate solution to form a mixture; (ii) forming a precipitate of a transition metal silicate, and (iii) washing and drying the precipitate thus formed to obtain the transition metal silicate, ~~wherein in said step (i), the ratio between the transition~~

~~metal salt solution to the alkali silicate solution is varied, the temperature at which the solutions are mixed is varied between 20° to 90°C, and the pH value of the medium is varied between about 2 to about 11.~~

74. (previously presented) The method as claimed in claim 73, wherein the contaminant is a metal selected from the group consisting of arsenic, mercury, lead, toxic metals, pesticides, and combinations thereof.

75. (previously presented) The method as claimed in claim 73, wherein the contaminant and or absorbent is a bio-molecule.

76. (previously presented) The method as claimed in claim 73, wherein the contaminant is chemical selected from the group comprising trihalomethanes, semi-volatile organic compounds, volatile organic compounds, phenols, and polychlorinated biphenyls.

77. (previously presented) The method as claimed in claim 73, wherein the contaminant is in gaseous form and contains carbon monoxide, sulphur dioxide, a nitrogen oxide, a hydrocarbon, tobacco tar, nicotine, a toxic chemical gas, or a combination thereof.

78. (new) A method for controlling microbes selected from the group consisting of protozoa, bacteria, fungi, viruses, and combinations thereof, said method comprising contacting the microbe with at least one functional transition metal silicate selected from the group consisting of:

(a) cupric silicates having a silica to copper ratio of 1:0.34, of 1:0.53, of 1:0.78, of 1:1, or of 1:5.15;

(b) zinc silicates having a silica to zinc ratio in the range of 1:2 to 1:12;

(c) silver silicates having a silica to silver ratio in the range of 1:15 to 1:19.5;

(d) manganese silicates having a silica to manganese ratio in the range of 1:1 to 1:1.9;

and

(e) zirconium silicates having a silica to zinc ratio in the range of 1:0.77 to 1:2.9;
wherein said transition metal silicates are prepared by the process comprising the steps of

(i) adding a transition metal salt solution to a soluble alkali silicate solution to form a mixture;

(ii) forming a precipitate of a transition metal silicate, and

(iii) washing and drying the precipitate thus formed to obtain the transition metal silicate.